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DRY TYPE AND PASTE TYPE JOINT CEMENTS CONTAINING POLYVINYL ACETATE AND POLYVINYL ALCOHOL AS BINDERS

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This invention pertains to wallboard joint cements; more particularly, it relates to dry type and paste type joint cements using as adhesive dextrin stabilized polyvinyl acetate and polyvinyl alcohol.

In dry wall construction, a method now very popular in the building of residences, a cement is used as an embedding adhesive for the wallboard tape applied wherever two pieces of wallboard are butted together. After the tape has been embedded, topping cement is applied to level the joint area with the rest of the wall. This combination of cement and tape covers or seals the joints and provides a smooth, uniform surface ready for painting or finishing.

The adhesive in conventional cements used for this purpose is generally and predominantly a protein material such as casein or soya protein. In spite of their acknowledged usefulness, protein joint cements possess several undesirable features. They cannot be stored for any length of time in paste form because of putrefaction and instability. After two to four hours, casein pastes undergo a moderate decrease in viscosity which may become rather pronounced after 24 hours. Protein cements are slow-drying; it is sometimes necessary to wait as long as 24 hours for one coat of such cements to dry before another coat can be applied. Other difficulties which commonly arise with these cements after they have been applied and dried are beading, blistering, edge-cracking, i.e. cracking near the edge of the tape, and shrink-cracking. Unfavorable job practices such as incorrect dilution of the dry cement and poor job conditions, for instance low temperature and high relative humidity, often magnify these defects.

Attempts to overcome these defects of protein binder joint cements, defects which are ultimately translated into increase in time and in labor costs of construction, have led to the formulation of new cements in which the protein binder is replaced with vinyi resins. Remarkable improvements have been achieved by this substitution but only with the inconvenience of having to employ ternary binder mixtures such as starch, polyvinyl alcohol and polyvinyl alcohol stabilized polyvinyl acetate mixtures. Styrene-butadiene polymers have also been tried as binders, but the broad range of adhesive characteristics of polyvinyl acetate favors the latter resin as do the excellent aging and freeze-thaw properties of certain specific types of this resin.

It is therefore an object of this invention to provide non-protein binder joint cements that may be used both as embedding and topping cements. It is also an object to provide cements that are stable on storage in dry form and in paste form. Another object is to provide cements that undergo a minimum of volume shrinkage on drying so that fewer minimum of coats are needed for a given application. Still another object is to furnish to the trade fast drying and strongly adhesive cements that are substantially free from beading, blistering, edge-cracking and shrink-cracking.

These objects have been accomplished by the formulation of joint cements based on binder systems composed of a special dextrin stabilized spray dried polyvinyl acetate resin emulsion, cold water soluble polyvinyl alcohol

or a mixture of these two resins. The bulk of the ingredients in these new cements consists of course of the more or less inert fillers which are conventional to this type of composition, with the exception however, that the employment of talc or lime is dependent on the type of cement prepared in that the selection of talc rather than lime is critical for paste type cements.

As to the advisability of using a single or a binary binder in these cements, it has been found that the use of both polyvinyl alcohol and polyvinyl acetate in the proportions required, produces all purpose embedding and topping cements, while cements containing only polyvinyl alcohol work best under low temperature application conditions, i.e. less than 72° F., and polyvinyl acetate cements are quite satisfactory at normal temperature, i.e. at least 72° F., or as topping cements.

The following examples will provide a better understanding of the invention. All parts and percentages are on a weight basis.

Example I

Formulation:	Parts by weight
Potassium tripolyphosphate	7.0
Methyl cellulose, 4000 cps. grade	17.0
Fine ground asbestos	170.0
Powdered Georgia marble ($CaCO_3$)	2,560.0
Fine ground mica	170.0
Talc, Sierra Mistron Vapor	31.5
Sodium acetate, anhydrous	2.0
Polyvinyl acetate powder	69.5
"Gelvatol 20/30 BP" polyvinyl alcohol	23.0
	3,050.0

"Sierra Mistron Vapor" talc is a commercially available talc of very high purity containing about 5% water, 62.5% silicon dioxide and 30.6% magnesium oxide, the balance of its composition being principally an iron oxide and some carbonates. It is a very soft, non-abrasive material of very fine particle size, 50% of the particles have a diameter of less than 1 micron and no particle diameter exceeds 6 microns, and of large surface area, i.e. about 19.2 square meters per gram of powder.

The polyvinyl acetate used is a spray dried, water-dispersible powder obtained from an aqueous emulsion of polyvinyl acetate containing 60% solids by weight and stabilized with a 10% dextrin by weight. The powder is free-flowing and has an average particle size of approximately 15 microns.

"Gelvatol 20/30 BP" is a very fine powder of about 88% hydrolyzed polyvinyl acetate with a viscosity of 4 to 6 centipoises as a 4% aqueous solution at 20° C.

In order to apply and use these ingredients, they are first mechanically blended. The mix is then added to water while stirring by hand, about 47 parts of water being used for each 100 parts of dry mix. Once the paste is smooth, it is allowed to soak for 30 minutes and the batch is remixed before use.

Example II

Another excellent dry type joint cement can be formulated as that of Example I, except that autoclaved lime, 61.5 parts, is substituted for the talc, 31.5 parts. This dry mix is quite stable on storage. Prior to application and use, it is made into a paste by stirring it into about 1540 parts of water.

Example III

As indicated earlier, joint cements containing lime have been found not too stable on storage in paste form. An excellent, stable paste which can be shipped and stored without loss of critical properties can be prepared by